REMARKS

The Office Action of September 11, 2009 has been carefully studied. The following paragraphs correspond to the order of the paragraphs of the Office Action:

1. The claims in the case are now 1-20 with claims 19 and 20 being added, support in the specification, page 1, lines 11 and 12. The addition of the vacuum treatment in claim 1 is supported by page 10, lines 14-19 of the specification.

2. For purposes of orientation, the claimed invention in its broad aspect is directed to the production of two types of biofuels produced from the same feed, with the first type being provided by a transesterification reaction of a vegetable oil with a methyl or ethyl alcohol in the presence of a heterogeneous catalyst. Because the heterogeneous catalyst can be easily and clearly separated, the resultant products are relatively pure, containing none of the remnants of homogeneous catalysts which are ordinarily present in glycerol from most prior art processes. The resultant crude glycerol can then be reacted, without any intervening chemical treatment, with an olefinic hydrocarbon to produce ethers or with aldehydes or ketones to produce acetals as a second biofuel.

In claim 1, there is no limitation on the nature of the heterogeneous catalyst, but in claim 4, it is seen that the catalyst is not based on zinc. Also in claim 5, a mixture of zinc oxide and alumina or a zinc aluminate, for example a spinel is cancelled, thus creating narrower claims based on catalysts which clearly distinguish over the prior art which is discussed below:

3. Claims 1-8 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable in Bradin (U.S. 5,578,090) in view of the English translation of Hillion (FR 2,704,768). It is noteworthy that Mr. G. Hillion is the lead inventor in both the cited patent as well as the present invention.

Hillion et al.

As seen from the reference, the filing date was August 11, 1999, and the French priority application relating to the present case was filed on February 24, 2004, more than 4 years

thereafter. This hiatus is important because it shows that it was not obvious at the time of the invention of Hillion et al. to arrive at the invention of the present application. The reason for this is that the concepts in both of the Hillion et al. documents are strikingly and unobviously different. The older Hillion et al. document relates to the transesterification of ricin oil which is in effect castor oil. In this ricin oil, 90% is constituted of 12-hydroxy-9-octadecenoic acid. The problem solved relates to this acid since before the earlier Hillion et al. invention, the acid during transesterification would be dehydrated (because of the hydroxy group) to form a conjugated diene, 9,11 compound which does not have the desired applicability and use as a non-dehydrated acid. It is well known that conjugated dienes have a tendency to polymerize which would be disastrous in the context of fuels and/or lubricants. Consequently, the problem solved by the earlier Hillion et al. patent relates to hydroxy acids and the undesired hydration of same to conjugated olefinic structures.

To accomplish the dehydration reaction, the earlier Hillion et al. inventors discovered that transesterification could be accomplished with a catalyst chosen from zinc oxide, a mixture of zinc oxide and alumina or a zinc aluminate consistent with a spinel structure, as set forth in Applicants' original claim 5 but now amended. Thus, the present invention in its more limited aspects relies on neither a feed containing ricin nor a catalyst of the type recited in the earlier Hillion et al. disclosure.

It is also important to note that the reference mentions that because of the solubility of glycerine in the ricin and ester, it is necessary to provide washing stages of the ester phase in order to separate the resultant glycerine from the monoesters of ricin. Accordingly, it is seen that claim 1 is amended by indicating that the glycerol in the crude state without any prior chemical treatment is subjected to esterification or acetalization in order to produce the desired glycerol acetal.

Accordingly, it was not at all obvious to Hillion et al. at the time of the prior invention relating to ricin, to conceive of a different process which does not involve hydroxy acids, much less to utilize a heterogeneous catalyst so as to provide a relatively simple process for transesterification and recovery of monoesters and glycerol, with no need for intervening chemical steps for purifying either product. The resultant glycerol can then be converted into a

second biofuel by esterification or acetalization to produce glycerol acetal as a second biofuel in addition to a first biofuel of the monoesters.

Bradin U.S. 5,578,090

This reference discloses a fuel additive composition that contains fatty acid esters and glyceryl esters. It is indicated in column 3, lines 35-37 that fatty acid alkyl esters could be prepared by transesterifying triglycerides with alcohols in the presence of acid or basic catalysts. The obtained fuel additive composition can be directly blended with diesel fuel or washed with water or other aqueous solutions to remove various impurities, including the catalysts, before blending (see column 6, lines 61-65).

U.S. 2003/016768

The cited reference discloses a process for converting the glycerine that is produced by transesterification of triglycerides with alcohol into compounds that can be mixed with biodiesel to improve its properties at low temperature, as well as its combustion. Homogeneous catalysts that are acid or basic are used in the transesterification stage described in this document: the temperatures indicated in the paragraph [0015] show that the process is an homogeneous process. Thus the crude glycerol obtained contains some residues of the catalysts, that limit the acetalization reaction requiring a neutral glycerol that is thus free of alcoholate. In order to obtain pure glycerol that can be used in acetalization reaction, an additional purification step is thus necessary.

Combination of References

The stubborn fact remains that the Bradin reference and U.S. 2003/016768 both disclose processes which utilize homogeneous catalysts which require washing or another purification stage in order to obtain a neutral glycerol which can be used to produce a glycerol acetal. Nothing in the cited documents alone or in combination would suggest to one of ordinary skill in the art that a process could be used which wherein the resultant ester and the resultant glycerol can be utilized for preparing two biofuels from the same vegetable oil without any intervening

chemical purification steps. Attention is courteously invited to Applicants' examples especially those starting on page 10, lines 14-19 being of particular interest and repeated herein as follows:

> The glycerol was then vacuum treated to eliminate traces of methanol.
>
> The glycerol obtained was intended for use without complementary treatment in the examples below.
>
> **EXAMPLES 2 TO 4: Synthesis of glycerol tertiobutyl ethers**
>
> Glycerol obtained from Example 1 was introduced in its crude form – i.e. with neither purification nor additional treatment… .

Dependent Claims

A discussion of the amended dependent claims and the newly added dependent claims is discussed above. As for the remaining dependent claims, Applicants respectfully submit that they merely add unobviouness to the claims at issue. For the record, Applicants do not acquiesce to any of the statements in the Office Action relating to the dependent claims which are not discussed individually in this response, and reserve the right to provide rebuttal comments at a later date if ever necessary.

In view of the above remarks, favorable reconsideration is courteously requested.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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